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1. An oligonucleotide-functionalized metal-organic framework (MOF) nanoparticle, wherein the oligonucleotide is a terminal phosphate-modified oligonucleotide and the phosphate forms a metal-phosphate bond with the metal ion of the MOF nanoparticle.

2. The nanoparticle of claim 1, wherein the MOF nanoparticle comprises zirconium (Zr), chromium (Cr), iron (Fe), and/or aluminum (Al).

3. (canceled)

4. The nanoparticle of claim 1, wherein the terminal phosphate-modified oligonucleotide has a phosphate group on its 3' end.

5. The nanoparticle of claim 1, wherein the terminal phosphate-modified oligonucleotide has a phosphate group on its 5' end.

6. The nanoparticle of claim 1, further comprising an agent selected from the group consisting of a peptide, a protein, a nanoparticle, an antibody, a small molecule, and a combination thereof, wherein the agent is encapsulated in the nanoparticle.

7. The nanoparticle of claim 1, wherein the terminal phosphate-modified oligonucleotide comprises a $(GGT)_n$ nucleotide sequence, wherein n is 2-20.

8. The nanoparticle of claim 1, wherein density of terminal phosphate-modified oligonucleotide on the surface of the MOF nanoparticle is from about 2 pmol/$cm^2$ to about 24 pmol/$cm^2$.

9. The nanoparticle of claim 1, wherein the MOF nanoparticle comprises a plurality of terminal phosphate-modified oligonucleotides on its surface and at least one oligonucleotide regulates gene expression.

10. (canceled)

11. (canceled)

12. (canceled)

13. A method of making an oligonucleotide-functionalized metal-organic framework (MOF) nanoparticle, comprising:

(a) mixing a metal ion and a multi-dentate ligand to form the MOF nanoparticle; and

(b) contacting the MOF nanoparticle with a plurality of the terminal phosphate-modified oligonucleotides, thereby producing the oligonucleotide-functionalized MOF nanoparticle, such that the phosphate groups of the terminal phosphate-modified oligonucleotides associate with coordinatively unsaturated metal sites (CUS) on the MOF nanoparticle surface via a metal-phosphate bond.

14. The method of claim 13, wherein the multi-dentate ligand comprises 2, 3, or 4 coordinating functional groups.

15. The method of claim 13, wherein the multi-dentate ligand is a bi-dentate ligand.

16. The method of claim 13, wherein the multi-dentate ligand is a tri-dentate ligand.

17. (canceled)

18. (canceled)

19. (canceled)

20. (canceled)

21. The method of claim 13, wherein the metal ion comprises a 12-connect $Zr_3$ cluster, a 6-connect $Zr_3$ cluster, a 8-connect $Zr_3$ cluster, a $Cr_3$ cluster, a $Fe_3$ cluster, a $Al_3$ cluster, or a combination thereof.

22. The method of claim 13, further comprising the step, prior to step (b), of contacting the MOF nanoparticle with the agent thereby encapsulating the agent in the nanoparticle.

23. The method of claim 13, further comprising step (d): adding a salt solution to the oligonucleotide-functionalized MOF nanoparticle, wherein step (d) is after step (c).

24. The method of claim 23, wherein the salt solution is added to a final concentration of 0.5 M.

25. The method of claim 23, further comprising step (e): contacting the oligonucleotide-functionalized MOF nanoparticle with one or more nanoparticles, wherein each of the one or more nanoparticles comprises an oligonucleotide that is sufficiently complementary to hybridize to the oligonucleotide on the surface of the oligonucleotide-functionalized MOF nanoparticle, and wherein step (e) is after step (d).

26. A method of inhibiting expression of a gene product comprising hybridizing a target polynucleotide encoding the gene with one or more oligonucleotides complementary to all or a portion of the target polynucleotide, the oligonucleotide being the terminal phosphate-modified oligonucleotide of the nanoparticle of claim 1, wherein hybridizing between the target polynucleotide and the terminal phosphate-modified oligonucleotide occurs over a length of the target polynucleotide with a degree of complementarity sufficient to inhibit expression of the gene product.

27. (canceled)

28. (canceled)